

REMARKS

Reconsideration and allowance of the subject application are respectfully solicited.

Claims 1, 3 through 15, and 29 through 45 are pending, with Claims 1, 15, 33, 35, 41, 42, and 44 being independent. Claim 15 has been amended.

Claims 1, 3 through 11, 15, and 29 through 45 were rejected under 35 U.S.C. § 103 over commonly-assigned U.S. Patent No. 6,225,637 B1 (Terashima, et al.) in view of newly-cited U.S. Patent No. 4,389,571 (Crewe). Claims 12 and 13 were rejected under 35 U.S.C. § 103 over Terashima, et al. and Crewe in view of U.S. Patent No. 4,954,717 (Sakamoto, et al.). Claim 14 was rejected under 35 U.S.C. § 103 over Terashima, et al., Crewe, and Sakamoto, et al., and further in view of U.S. Patent No. 4,469,949 (Mori, et al.). All rejections are respectfully traversed.

Claims 1 and 15 variously recite, inter alia, moving a principal plane of the first unit in a direction of an optical axis of the projection optical system (Claim 1) or moving a principal plane of the first unit (Claim 15), so that an image distortion of the projection optical system is corrected, with changing of an on-axis distribution of a magnetic field generated by the first unit in a direction of an optical axis of the projection optical system to move the principal plane of the first unit by changing a ratio of currents to be respectively supplied to the first and second magnetic lenses of the first unit (with Claim 15 further specifying that the change is on the basis of the correction information).

Claim 33 recites, inter alia, moving a principal plane of the magnetic lens in a direction of an optical axis of the projection optical system so as to adjust an image distortion of the projection optical system, wherein the controller changes an on-axis distribution of a

magnetic field generated by the magnetic lens in the direction of the optical axis of the projection optical system to move the principal plane of the magnetic lens.

Claim 35 recites, inter alia, a controller arranged to change a distribution of an axial magnetic field generated by the first unit in a direction of an optical axis of the projection optical system to move a first principal plane of the first unit in the direction of the optical axis of the projection optical system by changing a ratio of currents to be respectively supplied to the first and second magnetic lenses, and to change a distribution of an axial magnetic field generated by the second unit in the direction of the optical axis of the projection system to move a second principal plane of the second unit in the direction of the optical axis of the projection optical system by changing a ratio of currents to be respectively supplied to the third and fourth magnetic lenses, so as not to change a magnification of the projection optical system while correcting an image distortion of the projection optical system, wherein a moving amount of the second principal plane is equal to a value obtained by multiplying a moving amount of the first principal plane by a magnification of the projection optical system, and a moving direction of the first principal plane is the opposite direction to that of the second principal plane.

Claim 41 recites, inter alia, a controller arranged to move a principal plane of the magnetic lens in a direction of an optical axis of the projection optical system so as to adjust an image distortion of the projection optical system, the image distortion being distortion caused by an error of a projected image position in a direction perpendicular to the optical axis of the projection optical system, wherein the controller changes a distribution of an axial magnetic field generated by the magnetic lens in the direction of the optical axis of the projection optical system to move the principal plane of the magnetic lens.

Claim 42 recites, inter alia, a controller arranged to adjust an image distortion of the projection optical system, the controller controlling a current supplied to the magnetic lens, changing a distribution of an axial magnetic field generated by the magnetic lens in a direction of an optical axis of the projection optical system, and moving a principal plane of the magnetic lens in the direction of the optical axis of the projection optical system.

Claim 44 recites, inter alia, a controller arranged to adjust an image distortion of the projection optical system, the controller changing a distribution of an axial magnetic field generated by the magnetic lens in a direction of an optical axis of the projection optical system and moving a principal plane of the magnetic lens in the direction of the optical axis of the projection optical system.

However, Applicant respectfully submits that none of Terashima, et al., Crewe, Sakamoto, et al., and Mori, et al., even in the proposed combinations, assuming, arguendo, that the documents could be combined, discloses or suggests at least the above-discussed claimed features as recited, inter alia, in Claims 1, 15, 33, 35, 41, 42, and 44. In this regard, the Official Action acknowledges that Terashima, et al. does not show such features, and relies upon Crewe as showing “correction of... image distortion... where the energization of the lenses shifts the principal planes of the units respectively and corrects image distortion”. Applicant respectfully traverses such reliance. Applicant respectfully submits that Crewe discloses, e.g., sextupoles 24 and 26, wherein the downstream sextupole electromagnetic lens is operated to have a lesser strength than the upstream electromagnetic lens, and states that “interaction of the sextupoles and lenses compensates for third and higher order aberrations” (e.g., col. 2, lines 3-7; col. 6, lines 34-38), and makes mention of, e.g., “spherical and higher-order aberrations” (e.g., col. 1, lines 67-68). However, Applicant respectfully submits that neither the foregoing nor the remainder of

Crewe provides either a description or a suggestion of at least the above-discussed claimed features, including the recitation of image distortion as claimed. Applicant respectfully notes that the five aberrations according to the Seidel classification do include (1) spherical aberration, (2) comatic aberration, (3) astigmatism, (4) field curvature, and (5) image distortion; however, Applicant respectfully submits that image distortion is completely different from the other four aberrations. Furthermore, the assertions in the Official Action that claimed features are inherent in the cited documents is respectfully traversed by Applicant as being without support. Applicant further respectfully submits that there has been no showing of any indication of motivation in the cited documents that would lead one having ordinary skill in the art to arrive at the above-discussed claimed features. In this regard, Applicant respectfully notes that said features are recited in claims directed to projecting a pattern formed on a mask onto a substrate, which is not mentioned in Crewe.

The dependent claims are also submitted to be patentable because they set forth additional aspects of the present invention and are dependent from independent claims discussed above. Therefore, separate and individual consideration of each dependent claim is respectfully requested.

REQUEST FOR INTERVIEW

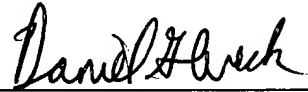
Applicant respectfully requests that the Examiner contact Applicant's undersigned representative to schedule a personal interview. Favorable consideration in this regard is earnestly solicited.

CONCLUSION

Applicant submits that this application is in condition for allowance, and a Notice of Allowance is respectfully requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our address given below.

Respectfully submitted,



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